HYDROGRAPHICAL WORK ON THE RUSSIAN SHORES OF THE PACIFIC*

About fifteen years ago a special hydrographical expedition was organized in the Russian Far East for the purpose of surveying the Russian shores of the Bering, Okhotsk, and Japan Seas. The work has been interrupted several times, as, for instance, in 1900, during the Boxer troubles, when the entire force of the expedition had to join the navy; in 1904-1905, during the Russo-Japanese war, when the whole force again joined the navy, and in 1906-1907, when the expedition had no vessel.

The first years after its organization, this expedition worked in Kwantung waters, made a survey of Korea Bay between Port Arthur and the Yalu River, of the mouth of the river and the islands in the bay, *viz.*, Elliot, Blonde and Bourchier. In Liaotung Gulf a survey was made of the western shores of the Kwantung Peninsula and the adjoining islands, and soundings of the shore waters. This work resulted in the making of twenty-two entirely new maps. In 1908 work was continued only about one month, owing to the late arrival of the steamer *Okhotsk*, which was purchased in England.

From 1909 to 1911 inclusive, the expedition made the following surveys on the coasts of Kamchatka, the Sea of Okhotsk, the Gulf of Tartary and the Japan Sea, enumerated in order from north to south. On the eastern coast of Kamchatka the new surveys included Baron Korf Bay (60° N. and 165½° E.), the coast from Cape Ilpinski to Cape Ozernoi (60° to 57½° N.) and from Cape Kronotski to Petropavlovsk (55° to 53° N.), and the harbor of Petropavlovsk and Avatcha Bay, on which it lies. The small peninsula which ends in Cape Lopatka, the southernmost tip of Kamchatka, was also surveyed. Of the western coast of Kamchatka that part which lies between the mouths of the Kambal and Ichi Rivers was surveyed. On the northern coast of the Sea of Okhotsk surveys were made of Yama Bay (59° N. and 155° E.) with detailed soundings for anchorages [this map was listed in the *Bull.* under "Siberian Coasts," (b), Vol. 43, 1911, p. 799], of Eirineisk Bay (59° N. and 146° E.), of the coast from here west to the town of Okhotsk (59° and 143° E.) and of this town and its roadstead. The position of the mouth of the Ooli River [Ulya? (59° N. and 142° E.)] was determined. In the western embayment of the Sea of Okhotsk the strait between Great Shantar and Little Shantar Island was surveyed; also Mamga Harbor (54⅓° N. and 126⅔° E.) on the western side of Tugur Bay. In the Gulf of Tartary detailed surveys were made, on Sakhalin Island, of the following bays: Shastye, Chaivo, Piltun, Pilevo, Tetuhe and Viakhta; and, on the mainland, of De Castries Bay (57½° N.). The reef near Zolotoi promontory was also surveyed and soundings of the western half of the Amur River estuary were made in great detail.

Sixty-eight astronomical and 220 trigonometrical points were fixed and used as a basis for the preparation of maps; 2,000 versts (1,326 miles) of the

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shore line were taken by circumferentor; 300 points were fixed by geodetical methods; 150 versts (100 miles) of the Okhotsk Sea were charted; the soundings made covered 25,000 versts (16,572 miles); 8,000 depths were taken; 10,000 versts (6,667 miles) of soundings, and 280,000 soundings were made from row boats, and about 5,000 soundings were made in ice.

In addition a great deal of work was done in connection with the study of currents, the temperature and the specific gravity of sea water, studies of the flora and the fauna of the sea, studies of terrestrial magnetism and earth refraction, meteorological elements and measuring of the changes of gravity with the Sterneck pendulum.

Being supplied by the Hydrographic Office with necessary instruments and outfit, the expedition established 53 deep water stations at which 97 faunal soundings and researches were made. This work, being done by means of trawlers and dredgings, has produced several thousands of sea animals, which were sent to the zoological museum, Imperial Academy of Science, St. Petersburg, and to the museum of the Priamur District at Khabarovsk. Exact magnetic studies were made at 208 points, and in 173 cases the earth's refraction was determined. The tides were studied at 66 points and tidal currents in 60 places. For the purpose of studying sea currents, 10,000 bottles were thrown into the sea.

In 1912 the expedition continued its work on the northern shores of the Okhotsk Sea and the Amur estuary. A survey of the Okhotsk shores was made from Eirineisk Bay almost up to Ola (151¼° E.) so that this whole stretch of coast is now correctly mapped. In this region detailed surveys were also made of Kulka Bay, Spafarieff (Korovyi) Island, Nagaeff (Volak) Bay, Shestakoff Bay and anchoring places in the mouth of the Ireti. This work is of special interest as it settles the question of harbors in the Okhotsk Sea, where before no safe harbors were known, and changes into a place of refuge a region that was a graveyard for vessels.

New and safe anchorages were found on Spafarieff Island (Bering Bay), and opposite it on the mainland in Shestakoff Bay. The third bay discovered by the expedition was named Nagaeff Bay, in honor of the first Russian hydrographer. In the Gulf of Tartary, Frederic Bay, near DeCastries Bay (51½° N. and 141° E.) was surveyed in detail from row boats. Phusun Bay was also surveyed.

In figures, the work of the expedition in 1912 consisted of the following: Ten astronomical and twenty-six trigonometrical points were fixed; exact magnetical studies were made at twenty-three points; 300 versts (200 miles) of sea shore were measured by traverse, 470 versts (312 miles) by survey from the ship, and 5,000 versts (3,314 miles) by soundings; 2,000 depths were sounded: 1,500 versts (994 miles) were surveyed and 32,000 soundings were made from row boats; the height of 630 points were determined by geodetical surveying, and twenty-nine deep water stations were established; in twenty-one places researches were made by means of trawlers and dredgings; 198 species of animals and 1,100 samples of plants were collected; and in twenty places the earth's refraction was measured 200 times.